Effect of water quality parameters on the migration of vinyl chloride monomer from unplasticized PVC pipes

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Abstract: The migration of vinyl chloride monomer (VCM) from unplasticized polyvinyl chloride (uPVC) pipes was investigated using locally manufactured pipes. Specimens of 33 cm long were used throughout the research. The investigation was carded out under different conditions of water temperature, pH and total dissolved solids concentration and at different durations of exposure. The VCM concentration in the water was evaluated using the gas chromotography (GC)/head-space technique. A VCM concentration of more than 2.5 ppb was detected after 30 days of exposure at 45 °C. The initial VCM concentration in the uPVC pipe was predicted using equations derived from Fick's first law of diffusion. Water temperature did not affect the migration of VCM, unless it was raised to high values (i.e. 45 °C). Total dissolved solids (TDS) and pH of water were found to affect the release of VCM from uPVC pipes. Diffusion rate of VCM was predicted as a function of pH or TDS values.